AGRICULTURAL NEWS LETTER

VOL. 21-NO. 4 [illegible] 1953

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

DU PONT

ISSUED BY PUBLIC RELATIONS DEPARTMENT, E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DEL.

AGRICULTURAL NEWS LETTER

Published bi-monthly by the
Extension Division, Public Relations Department

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Wilmington 98, Delaware

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The AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and new ideas in the field of agriculture, particularly as they are related to advancements through research. Material appearing herein may be reprinted in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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WHAT FARM EDITORS ARE SAYING --

"If peace should eventually be achieved ...it would bring the opportunity to do a number of things that need to be done and to open up some new frontiers...As one well-informed man remarked: 'We have been giving so much of our energy and attention to war since 1941 that we don't know the peacetime limits of the world we're now living in. The laboratories have revealed dozens of secrets that we might draw upon. We have little idea, for instance, of what atomic energy will mean once we begin harnessing it to civilian uses. The next ten years could be as revolutionary in advances as any in our history.' These... opportunities...offer plenty of reasons for cheer...not fear."
-- Robt. Reed in COUNTRY GENTLEMAN

"Many dairymen express the thought that the industry would do better to spend more money on advertising, less on legislative matters that too often put the hard working dairyman in the wrong light with the rank and file of consumers."
--Nelson Crow in WESTERN DAIRY JOURNAL

* * * * * * * *IN THIS ISSUE* * * * * * *

"No longer can men continue farming who deliberately ignore ways to be more efficient." -- Kirk Fox in SUCCESSFUL FARMING

"It is high time that pressure groups stop running to Uncle Sam for financial help that should properly be supplied by the local community, county, or state, which is the primary benefactor and which can usually do the job cheaper. Remember, the tax dollar that is sent to Washington to pay for such projects never comes back in its entirety.

--Tom Leadley in THE NEBRASKA FARMER

"Taxes have neared a point of diminishing returns, so lower taxes, they say, would encourage industrial expansion and the establishment of new enterprises, thus actually increasing government revenue...Banks are loaded with savings that would be invested in productive enterprises if the owners of this idle money were assured of reasonable returns."

-- Frank A. Briggs in FARM AND RANCH

"Never before in history have so many people lived at such a high standard as they do in the United States today. Why? Because we have a big market which has been convinced of the value of having something better; and we are using new ideas to offer something better faster than ever has been done before."

--Walter J. Murphy in AGRICULTURAL AND FOOD CHEMISTRY

IMPROVING POTATO YIELDS

in Western Maryland

An opportunity to study nutrient requirements of potatoes has been afforded by the close similarity in the climates of western Maryland and the potato-growing area of Maine. A comparison of the climate in both areas, indicating that western Maryland should be favored, is given in Table I below:

Mean July temperature	Rainfall (av.) in inches			No. of growing days
	Annual	July	August	
Western Maryland--67.4°F	45	4.71	4.26	116-124
Maine--67.3°F	36	4.2	3.56	107-117

Actual yields for these areas in 1949 were 154 bushels per acre for western Maryland and 450 bushels per acre for Maine. It appears, then, that soil differences are primarily responsible for the wide spread in production figures.

The best results obtained in various fertilization tests conducted over the period of 1917 to 1950 are shown in Table II below:

Time of research	Best treatment	Yield	Investigator
1917-1922	20 T, manure/acre	209	McCall
1935-1939	5-8-7 1,000 lbs/acre	203	Metzger
1940-1945	4-10-10 1,000 lbs/acre	258	Thomas
1948-1950	6-6-6 1,400 lbs/acre plus 1 year of green manure	303	Thomas

As part of its continuing efforts to establish a soil fertilization program which would increase the potato yield in western Maryland, the Agronomy Department of the Maryland College of Agriculture conducted an interesting program during 1950 and 1951. Two of the aims of this program were to:

1. Supply adequate amounts of fertilizers to account for plant needs and soil retention.

2. Supply nutrients to the plants in different ratios throughout the growing season.

J. H. Axley and H. B. Winant, who conducted the experiment, applied nine different fertilizer treatments over a two year period. All nine included ten spray applications of 8.8 pounds of nitrogen in the form of urea throughout the growing season to provide a constant supply of nitrogen.

To provide the relatively large amounts of phosphorus required by potatoes in the early stages of growth, 600 pounds per acre of 3-12-12 was distributed in the rows in all but the control areas. To supply the abundance of potash required by potatoes in the later stages of growth, a 0-6-20 mixture was broadcast and disked-in prior to planting in some of the test areas. A

relatively large supply of nitrogen was also applied as a side dressing 50 to 60 days after planting. The amounts of these applications and their effect on yields are indicated on Table III below:

Row application 600 lbs/acre	Broadcast 1,000 lbs/acre	Supplemental nitrogen lbs/acre sidedressed	N in spray	Yield in bu. per acre in 1950	1951
			88	270	256
3-12-12			88	353	345
3-12-12	0-0-21		88	355	325
3-12-12	0-6-0		88	367	332
3-12-12	0-6-20		88	404	401
3-12-12		150	88	450	362
3-12-12	0-6-20	150	88	512	416
3-12-12	0-6-20	250	88	516	412
600 lbs/acre	2,000 lbs/acre	sidedressed	spray		
3-12-12	0-6-20	250	88	504	420
3-12-12	0-6-20	150	88	534	393

Where urea in sprays was the only fertilizer material applied, the yield was 116 bushels above the county average -- an increase of more than 70 per cent, indicating that this constant supply of nitrogen throughout the growing season gave marked increases in yield.

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EDITOR'S NOTE -- The program discussed above was the first to incorporate regular applications of urea sprays throughout the growing season. It is noteworthy that the urea sprays alone accounted for yields well in excess of the county average and that the urea sprays plus additional fertilization produced crops far in excess of previous highs as in Table II.

Since urea sprays were used in all treatments in this program, a quantitative measure of crop increases due to their use alone cannot be made. However, by comparing the yield of control plots (in which urea alone was used) with the county average yield for the previous year - 154 bushels per acre - an increased return on the order of $140 to $200 per acre appears indicated. Cost of the urea used was approximately $15 per acre.

Urea suitable for spray programs similar to the one above is available in the form of Du Pont "NuGreen" fertilizer compound.

NEW SPRAY FOR GARDENERS -- Available for the first time this summer is Du Pont Aphid & Mite Spray. Packaged for use by the home gardener, this product is based on the new chemical, malathion. Besides the two pests in its name, it will control leafhopper, mealybugs, thrips, Japanese beetles, Mexican bean beetles, cabbageworms, and many other hard-to-kill insects. Recommended uses cover rose gardens, flower beds, vegetable plots, and evergreens.

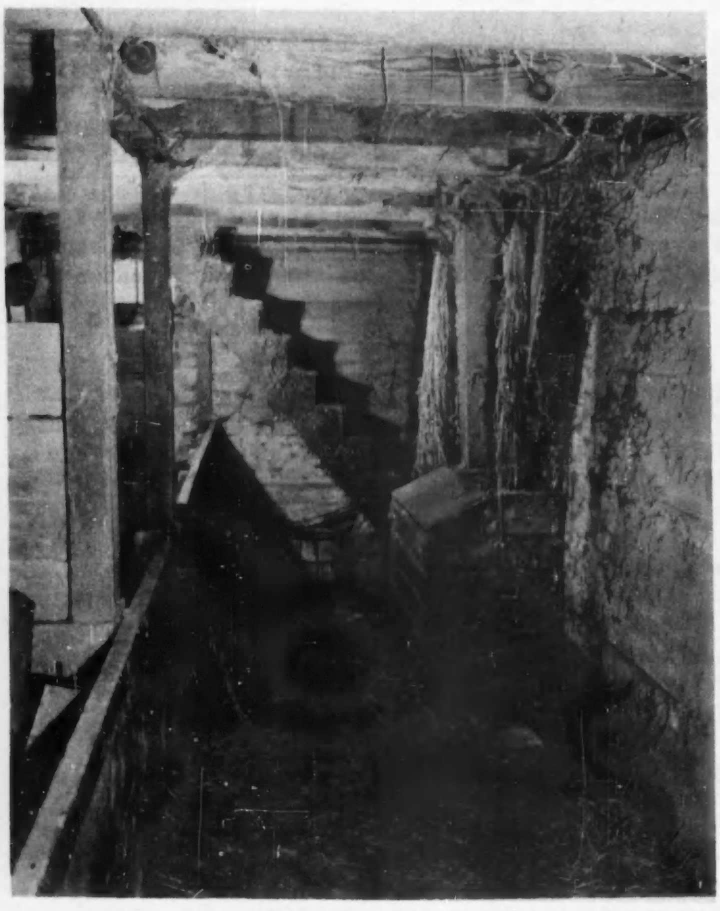
WHERE DO THE INSECT PESTS IN STORED GRAIN COME FROM?

By DONALD A. WILBUR and LLOYD O. WARREN
Department of Entomology, Kansas State College

With regulatory authorities cracking down on insect-infested grain moving from farms to mills, it's worthwhile to ask: "Where do the pests come from?"

When you know where the "bugs" come from, it's easier to control them. Of half a dozen or more major insects that infest grain, none cause serious infestation in the field except in localized areas -- mostly in the South. That means that the farm itself may be the first source of infestation.

Last summer, we surveyed 115 farms in four central Kansas counties to see what we could find about insect infestation originating on farms. We paid some attention to farm granaries, of course, but we were particularly interested in finding the extent to which grain infesting insects might be harbored in grain or feed residues outside the granary itself.



Hay stringing down from the mow, a feed box with a loose lid, unswept walls littered with debris -- all contribute to a fine breeding place for grain insects.

We found at least 15 different kinds of grain-infesting insects in farm buildings other than granaries. The sites included poultry houses (especially feed rooms), hog feeders, other feed rooms, mangers and feed boxes, corn cribs, hay mows, barreled or sacked grain, floor litter, elevator pits, combine hoppers, truck and wagon beds, grinding facilities, and seed drills.

Feed rooms were found to harbor each of the 15 different species collected, and were the most frequently infested of all sites. All 15 species we also found in barreled or sacked grain stored in various buildings. Poultry houses, mangers, feed boxes and corn cribs were also abundantly infested. Even hay mows harbored six different species.

The degree of infestation found in truck beds was considered especially significant -- since it might otherwise be assumed that the way to keep the new crop clean would be to truck it right from the combine to the elevator. But with nine different species of insects in truck and wagon beds, serious infestation might develop en route. Even where there was no appreciable amount of grain or feed showing in the truck bed, insects were present in cracks or between the floors in double-floor construction. Several times infested trucks or wagons were parked in granary driveways. It seems obvious that vehicles used to carry feed about the farm and transport grain to market may spread insect contamination.

Nearly 90 per cent of the feed rooms examined had waste grain or feed residues overhead, in the walls, on the floor, or around the door. Grain dust and feed had accumulated on sills and cross members, loft floors, and occasionally on the lower surface of the roof -- wherever structural features provided a lodging place. Cracks, cadelle holes, and spider-web masses were commonly infested. In grain bins, granaries, and corn cribs, waste grain accumulations were found in just about every possible place, particularly granary driveways, bin floors, and door-sills.

Grain losses due to insects in farm storage have been estimated to run as much as two per cent a month. This can mean a loss of five million bushels a year on Kansas farms alone. The small cost of cleaning up and spraying farm trouble spots is cheap insurance to prevent this loss and keep harvested grain clean until it goes to market.

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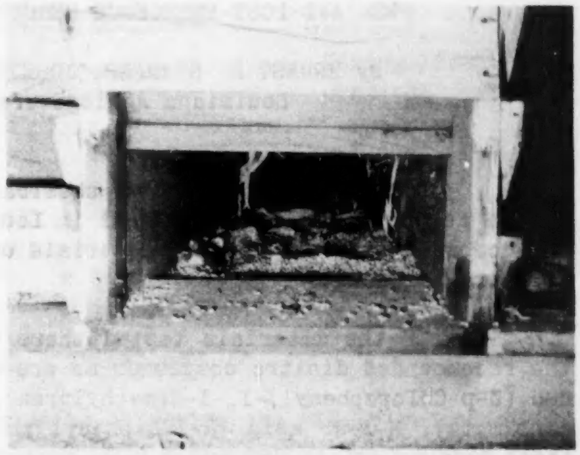
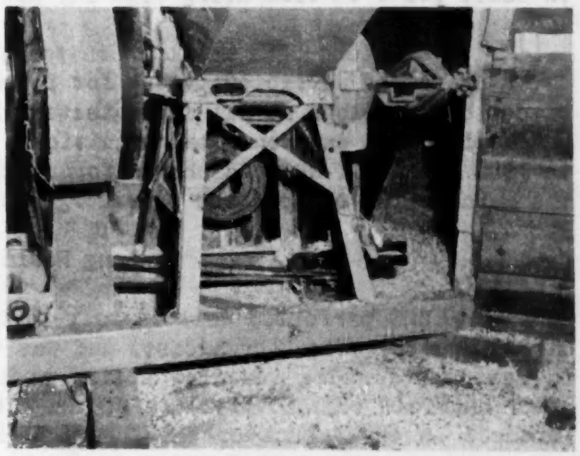
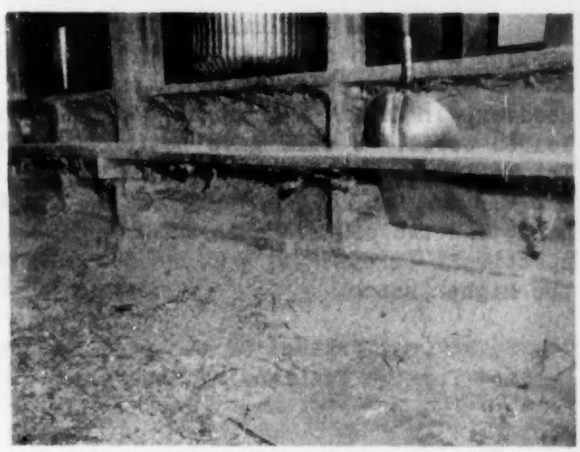
EDITOR'S NOTE -- Information on the use of methoxychlor insecticides, approved by USDA for spraying grain storage facilities, will be sent on request. Address "Agricultural News Letter", Du Pont Company, Wilmington, Delaware.



This corn-crib ventilation chute was infested with saw-toothed grain beetle and granary weevil.



Spilled grain around this mill harbored flat grain beetle, saw-toothed grain beetle and granary weevil.



Milled feed accumulations behind the manger backboard make a potential home for insects that contaminate the grain crop.

PRE- AND POST-EMERGENCE HERBICIDES FOR WEED CONTROL IN COTTON

By ERNEST R. STAMPER, JOSEPH L. SMILIE, and C. B. HADDON
Louisiana Agricultural Experiment Station

There were a number of chemicals tested for pre-emergence treatment of cotton for weed and grass control in Louisiana in 1952. The new chemicals were all compared with the dinitro materials used at the recommended rate of six pounds per acre broadcast.

Of the materials tested there were four that compared favorably with the recommended dinitro compounds as pre-emergence sprays. These materials were CMU (3-p-Chlorophenyl)-1, 1-dimethylurea), 3 CIPC (Isopropyl N-(3-Chlorophenyl)-carbamate), N-1-NP acid (N-1 naphthyl phthalamic acid), and Dichloro Urea. Of these four materials CMU and 3 CIPC showed possibilities and are being tested under field conditions again in 1953. The N-1-NP acid and Dichloro Urea are being kept in small plots in 1953 along with any new materials sent in to be tested in 1953.

Dichloro Urea has been in tests in Louisiana for several years but has never proved of sufficient value for field trials. N-1-NP acid caused stunting of cotton seedlings at all rates tested (5, 10, 15 pounds per acre broadcast) and under different environmental conditions. This material did not show much promise in 1952. The N-1-NP acid showed formative effects similar to 2,4-D, on some of the weeds which escaped the pre-emergence spray.

Long Residual Action

CMU performed well in most tests at rates of one pound to one and one-half pounds per acre (broadcast) and was toxic to cotton at two pounds per acre in most tests. Its residual action at the rates mentioned is longer than any other chemical tested. Because of the difficulties in application, the small differences in the amount of this chemical needed to control broadleafed weeds and grasses, and the amount found to be toxic to cotton, it is felt that great care must be taken in maintaining this material in suspension during application.

3 CIPC performed well in experimental tests conducted by the experiment station and also commercial applications in 1952. The toxicity of this chemical to cotton in tests occurred at rates between nine and 12 pounds per acre (broadcast). However, in 1952, six pounds did not give adequate control of grasses and broadleafed weeds. 3 CIPC gave better control of grasses than of broadleafed weeds. The residual action of 3 CIPC was somewhat longer than with the dinitro materials but was not as long as with CMU at comparable rates. CMU at one, one and one-half, and two pounds compared to 3 CIPC at six, nine, and 12 pounds per acre respectively (broadcast) performed about the same, both being toxic to cotton at the higher rates.

Cost figures on the pre-emergence and post-emergence treatments are summarized for the outstanding materials.

Cost Figures on Experimental Plots - 1952

Treatment blanket rate	Saving over check	Saving less chemical cost
6 lbs. DN	$ 6.10	$ .75
9 lbs. 3 CIPC	13.60	6.10
1 ½ lbs. CMU	14.10	10.85

Avg. check cost $16.10 per acre
1 post-emergence oil @ $1.50

Post-emergence Application

A post-emergence test was designed to determine the effectiveness of the direction of application using three residual herbicides and one contact oil. This test was superimposed on one-fourth acre test plots that were treated with pre-emergence materials in the following manner:

1. CMU at one pound (blanket rate) as a post-emergence spray on one, one and one-half, two pounds of CMU (blanket) pre-emergence, and on an untreated check.

2. CIPC at six pounds (blanket rate) as a post-emergence spray on six, nine, 12 pounds of CIPC (blanket) as a pre-emergence spray, and on an untreated check.

3. "Premerge" (dinitro) at three pounds (blanket rate) as a post-emergence spray on six pounds dinitro (blanket rate) as a pre-emergence spray, and on an untreated check.

4. LHO1 (Lion Oil) 25 gallons (blanket rate) as a post-emergence spray on all rates of CMU, CIPC, and dinitro as pre-emergence sprays, and on an untreated check.

How Nozzles Were Set

In one nozzle setting, the spray pattern was directed across the drill in the conventional manner. In the other nozzle setting, the pattern of spray was directed opposite to the direction of travel and parallel to the drill. The nozzles were one and one-half inches above the seedbed and ten inches apart in both settings. The nozzles were mounted on a floating shield developed by the Louisiana Agricultural Experiment Station. In both settings the nozzles were angled down so the spray pattern would strike the ground at 10 inches from the nozzle tip. The spray patterns overlapped one and one-half inches over the drill, thus insuring complete coverage of the 10 inch band in the parallel application.

Counts were made on 36 feet of row, six inches in width and centered on the drill. The per cent control of the grasses and broadleafed weeds was based on the average of the untreated check plot.

There was very little difference in weed and grass control with the two nozzle settings in these applications, as may be seen in the data in the following

table. A second post-emergence application of dinitro applied after hoeing June 5 gave perfect control of weeds and grasses. Stands of cotton were not reduced with any of the post-emergence materials at either nozzle setting. The oil injured or girdled the cotton stems most in the plots sprayed in the conventional manner. None of the materials caused serious injury to the cotton plants, with either nozzle setting.

Average Weed Control and Yield of Cotton Using Various Chemicals and Application Techniques with Post-emergence Sprays

Material	Rate/A	Nozzle setting with reference to drill	Average % Control June 5 Grasses	B.L.	June 26 Grasses	B.L.	Yield of seed cotton in lbs/a
LH01	25 gals.	across	71	66	55	57	2080
LH01	25 gals.	parallel	59	67	59	71	1994
CMU	1 lb.	across	83	58	97	67	2193
CMU	1 lb.	parallel	76	74	100	67	2510
3CIPC	6 lbs.	across	97	93	97	17	2098
3CIPC	6 lbs.	parallel	95	96	93	50	2133
DN	3 lbs.	across	41	41	100	100[1]	2172
DN	3 lbs.	parallel	38	60	100	100[1]	2448

[1]Received a second application before counts were made.
Cotton planted April 17 - material applied May 15.
Counts, June 26 was after one hoeing.

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EDITOR'S NOTE - The above article is condensed from a paper delivered by Dr. Stamper at the recent Southern Weed Control Conference in New Orleans.

AWARDS TO EDITORS

Kirk Fox, editor of "Successful Farming," and Mason Gilpin, editor of "Pennsylvania Farmer" received awards for "superior journalistic contributions...toward the building of soils of our Nation" at the recent convention of the American Plant Food Council. A board of judges made the selections from among 37 magazines representing more than 45,000,000 total readership. "Successful Farming" was judged winner among publications with more than 300,000 circulation, and "Pennsylvania Farmer" among publications under this circulation. Speaking of the two winning editors, Louis H. Wilson, secretary of the Council, said that "the story of our soils and how to keep them productive...is a story that they and their staffs tell as a matter of routine... with a quiet enthusiasm that inspires their readers to become more successful farmers."

THE OUTLOOK IN FIBERS

By ANDREW E. BUCHANAN
Textile Fibers Department
E. I. du Pont de Nemours & Co., Inc.

For the past nine years I have been concerned with the manufacture of five fibers which we make and sell to the textile industry -- rayon, acetate, nylon, "Orlon" acrylic fiber and "Dacron" polyester fiber.

Let me make it clear that the Du Pont Company does not make any fabrics or stockings or cloth of any kind; we sell our fibers to the textile mills just as the cotton growers and wool growers sell their fibers as a raw material to the textile mills. Thus, automatically, we are in competition with natural fibers which are products of agriculture and animal husbandry. I shall try to discuss broad aspects of this competitive situation as objectively as I can.

Competition between fibers is nothing new; in 1800 wool was the world's predominant fiber, being used in the ratio of 20 to one over cotton; last year cotton was used in a ratio of 10 to one over wool. More recently, you have seen nylon practically eliminate silk from the ladies' hosiery market. In the past decade rayon has practically pre-empted one of cotton's largest markets -- automobile tire cord fabric.

All of these shifts in preference for one fiber over another are clearly traceable to two influences -- sociological and economic. The first is represented by changes in our manner of living, as for instance in the steady trend to lighter weight clothing, as homes, work-places and automobiles came to be universally and automatically heated, and in the equally pronounced trend toward informality in dress and the widespread adoption of sports clothes, a by-product of increased opportunity for leisure and recreation.

The economic influence is even more clearly discernible -- nylon made possible a longer wearing, more glamorous stocking at a lower manufacturing cost; rayon tire cord made possible a stronger, longer wearing tire at a lower manufacturing cost. Under our American system of free enterprise, a better product at a lower cost is automatically "elected" by the purchasing public, no matter how badly the defeated candidates may feel about it.

Fiber Consumption

Let us look at the way in which U. S. fiber markets in this country have been divided between the competing fibers during the past 30 years. For about 20 years, the per capita consumption of textile fibers hovered around 30 pounds per person. Coincident with the start of World War II, the per capita consumption jumped up to 50 pounds per person, and it has averaged in the middle forties ever since. _If_ we could assume that this higher per capita consumption is here to stay we could reach the comforting conclusion that all commercial fibers may anticipate larger markets.

Unfortunately, we can find no very good grounds for this assumption. The per capita consumption is currently trending downward, and we have reason

to believe that it must drop further before it can be regarded as having reached what might be called a post-war norm.

When rayon was first produced in this country in 1910, it was an insignificant factor in the total textile market. By 1930, rayon had grown to 118,000,000 pounds. Joined about that time by acetate, these two man-made fibers accelerated their penetration of textile markets until in 1952 they accounted for 1,212,000,000 pounds or 19 per cent of all textile fibers consumed in this country.

Depends on How You Look at It

Now let me give you an example of how perfectly factual data can be interpreted in two entirely different ways to produce different emotional reactions. One could say of cotton: "In the same period, U. S. consumption of cotton increased from 2,828,000,000 to 4,479,000,000 pounds per year -- an increase of 60 per cent in 32 years! Long live King Cotton!" One could say of wool: "In this same period wool consumption (clean) has increased from 314,000,000 to 474,000,000 pounds, an increase of about 60 per cent! Hooray for wool!"

Now, suppose one prefers to produce the opposite emotional reaction: One could say of cotton: "In the period charted here, cotton's share of the U. S. textile market dropped from 89 per cent to 70 per cent. King Cotton's throne is threatened!" Or of wool: "In this same period wool's share of the market dropped from 10 per cent to seven per cent. There ought to be a law - - !"

But as I told you in the beginning, I am trying to be objective -- not emotional -- and to me this data says that rayon and acetate have enjoyed a more rapid rate of growth in the past 32 years than the natural fibers. This penetration by the man-made fibers has been made at the expense of limiting the growth of both cotton and wool. Let's discuss briefly some of the reasons for the gain by rayon and acetate.

Reasons for Popularity

First, in their efforts to give better values in apparel, textile mills have learned to produce serviceable and attractive fabrics for end uses previously reserved to wool, from rayon and acetate selling for 34 to 35 cents a pound instead of from fine territory wools at $1.75 to $1.80.

Second, because they are not subject to the randomness characteristic of nature, man-made fibers have something which we call uniformity. Briefly, this means that any bundle of fibers picked from a bale today will be very much like a bundle picked tomorrow -- or next year. The staple length and diameter will be the same, they will be free of grease and dirt, they will be neither more nor less harsh or tender.

Furthermore, their production is not seasonal and their price is relatively stable, so mills can operate on minimum inventories with reasonable assurance of non-fluctuating values.

Not "Replacing" Wool

We are by no means expert in wool matters but we observe that land areas of the world open to wool production tend to shrink rather than to expand

and we can readily understand that production costs might put the domestic grower in an uncomfortable position opposite imports. The only conclusion we have been able to draw is that to date man-made fibers have been supplementing, rather than replacing, wool in a period of rising demand for wool-type fabrics.

The man-made fiber business is distinctly not a business you can go into "on a shoe-string." To make five fibers, the Du Pont Company operates 13 very large plants. To duplicate them would cost well over a billion dollars. And even if you had the billion dollars you couldn't do it until you had invested many more millions in research and experimental work to get information you'd need to design and operate them. Even after plants are in operation, our Textile Fibers Department must spend over $15,000,000 every year on research and development work just to keep improvements in quality and reductions in cost coming, and to develop new and better fibers to supplement or replace those that become unprofitable.

What is a man-made fiber plant like? Take for instance one we have just completed -- the "Dacron" polyester fiber plant at Kinston, N. C. It employs about 1500 people, most of whom were never inside a manufacturing plant before but each of whom has acquired skills and understanding in highly specialized operations and of complex chemical engineering equipment. The plant adds over $500,000 a month to the purchasing power of this little community which was previously largely dependent, economically, on its tobacco crop. The cubical content of this plant is nearly 9,000,000 cubic feet; it includes its own power plant with capacity to supply a city of 35,000; for every pound of yarn it produces, the plant must condition and circulate 13,000 cubic feet of air.

The Big Gamble

When this plant was completed, it represented a gamble of $65,000,000 -- and I use the word "gamble" advisedly.

In the first place, we cannot be sure that it will run at all, for there are a hundred points at which a mistake in our calculations and design could prevent it from producing a satisfactory product.

Far more of a gamble, to us, is the fact that we have no assurance that the textile industry will buy our output; all we know is that our product will have inherent properties that should bring new features of service, durability, ease of care and beauty to American textiles.

Once the market for this product is established, the same engineering and research brains that brought it into being will be applied to increasing efficiencies, lowering costs, increasing output, improving quality, developing variations for special applications -- all of which is designed to make possible, over the years ahead, a reduction in selling price.

Price Reductions

Our first rayon sold in 1921 for $2.70 a pound. The same rayon yarn, vastly improved in quality, sells today for 78 cents a pound.

Our first acetate yarn sold in 1929 for $2.00 a pound. The same yarn sells today for 73 cents a pound.

A typical nylon yarn was introduced in 1939 at $4.27 a pound. Today the same yarn, again vastly improved in quality, sells for $2.70 a pound, in spite of the fact that every item of cost has increased materially during these inflationary years.

"Orlon" acrylic fiber and "Dacron" polyester fiber are just beginning, but assuredly they will conform to the same general pattern. This is the Du Pont pattern, and the pattern of enlightened American free enterprise.

I have referred to the growth of rayon and acetate. These were the first two man-made fibers. Both are made from cellulose, either in the form of cotton linters or wood pulp. In both cases, man starts with an agricultural product, put together by Nature for its own marvelous purposes, and adapts it to his own purpose.

The Complete Synthetic

With the discovery of nylon, a very fundamental new tool was vouchsafed to mankind. With nylon, man learned for the first time how to combine the elemental atoms into molecules that were designed to be fibers. The cellulose molecule was designed by Nature to be a plant or a tree and man could only adapt it to use as a fiber. But the nylon molecule was designed by man himself to be a fiber. Revolutionary as nylon proved to be, of itself, the fact that it showed man the way to put together thousands of entirely new molecules was of still greater significance in its implications for the future.

Close on our heels, our many strong competitors are bringing their candidates into the marketplace. By the end of 1954 programs already under way will have swelled the production of the truly synthetic fibers to 548,000,000 pounds per year, and cotton, wool -- and this time rayon and acetate too -- will begin to feel a new squeeze. Note, if you please, that the Du Pont Company will be competing with its own established products. This, too, is part of the Du Pont philosophy -- if new products can be developed that offer better values to the consuming public, they are sure to prosper at the expense of the older product. Therefore, it is better to compete with ourselves than to be put out of business by somebody else.

Let us attempt to assess the probable effect of the imminent growth of the new synthetics on the market for wool. Nylon, "Dacron" polyester fiber and "Orlon" acrylic fiber are more expensive than rayon and acetate, and also offer a higher level of performance. In some respects, their performance is much like wool, in other respects they are quite different. In no sense are they "wool substitutes". But this is the thing that those interested in wool should watch -- the sum total of consumer acceptance of these newer fibers rather than their deficiencies when compared with wool itself.

No Wool Decrease Seen

You should also recognize that wool is a known and stabilized commodity whereas the synthetic fiber field is extremely fertile and dynamic -- it may sprout additional threats to established fibers any time at all. On the other

hand we do not expect any dramatic or devastating decrease in wool markets in the forseeable future.

To give you the long-range viewpoint, consider fundamental factors that, in my opinion, are bound to dominate the textile fiber picture 25 years from now. My conviction about this future is based on things I have seen and discoveries that are being made right now in research laboratories of this country.

First, it appears inevitable to me that textile processing will be vastly simplified and thus made more economical in the next generation by virtue of the availability of synthetics.

Second, the textile industry will learn how to use the snythetic fibers much more effectively. Bear in mind that it has taken hundreds of years to progress from the homespun fabrics of colonial days to the fine woolen and worsted fabrics of today.

Finally, and most important of all in this long-range view, we should recognize that the basic discovery, illustrated by nylon, -- of the secret of combining the elementary atoms into a molecule that is designed to be a fiber -- this discovery has, in effect, placed at man's disposal the means of creating synthetic fibers incorporating or accenting almost any desired property. This definitely does not mean that all conceivable desirable properties can be designed into one fiber -- indeed no conceivable combination of fiber properties would be good for all end-uses.

Onions and Cantaloupe

To use a homely analogy, when you want to dress up a hamburger sandwich there's nothing better than a slice of Bermuda onion, and when you want a special treat for dessert there's nothing better than a Rocky Ford cantaloupe. Now an ambitious onion grower with an eye on the dessert market might try every conceivable kind of cooking or flavoring or preserving in an effort to make his onions taste like a cantaloupe, but you and I would still prefer Rocky Fords. Finally, he would realize that if he wants to break into the dessert market he'll have to go back to the beginning and plant a different seed.

That is just about what the synthetic organic chemist has learned to do -- go back to the elemental atoms and put them together as compounds which will become textile fibers as widely different in usefulness as onions and cantaloupes.

In summary, our long-term picture shows an increasing number of synthetic fibers, each being made to serve a specialized, specific end-use better than previously known fibers. And as always in America, it will be Mr. and Mrs. J. Q. Public who decide, by their purchases, what kind of fabrics will be made, and neither the sheep, nor the silkworm, nor the Du Pont Company is going to have much to say about it.

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EDITOR'S NOTE -- The preceding article is condensed from a speech delivered by Mr. Buchanan before a recent meeting of the Denver Agricultural Club. It is presented here as an attempt to appraise the trend in modern textile production and sales -- a trend which may affect the future of agriculture's fiber crops.

FRITTED TRACE ELEMENTS

A New Form in Which Elements Vital to Plant Growth Can be Supplied...Said to be Safer and More Effective

By LEO MOZELSKI
Agronomist
Ferro Corporation

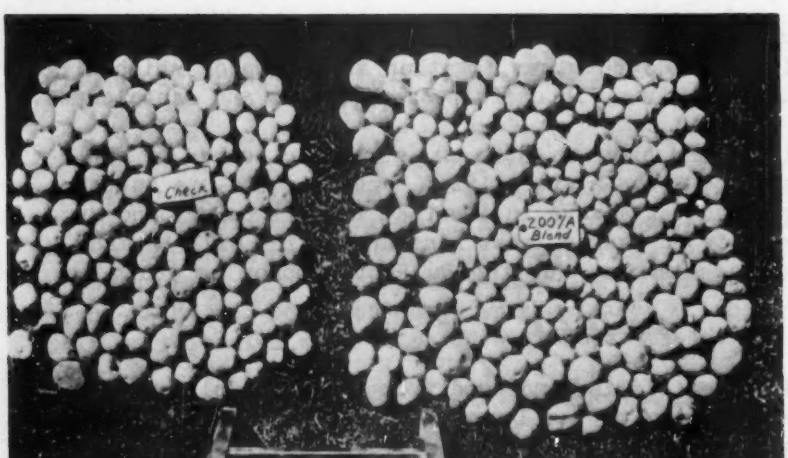
The increased use of high analysis fertilizers and more intensive production of vegetable crops many times results in trace element deficiencies which affect the quality and yield of crops.

In the soil, adequate amounts of the trace elements in a form available to plants are as essential to healthy plant growth as are the major fertilizer elements. The principal causes of trace element deficiencies in the soil are crop removal, fixation, and leaching. When trace elements are applied to the soil in a highly soluble form, they are very susceptible to loss by leaching and fixation. Over-application of many trace elements in a highly and quickly available form will kill or damage plants -- making indiscriminate application a hazardous business.

Over the past five years, a program of research and experimental work has developed a new method of supplying trace elements to the soil in a form which is slowly available to plants, yet supplies sufficient quantities during the growing season for healthy plant development. Strangely enough, this new agricultural tool is an outgrowth of the enamel research of the Ferro Corporation of Cleveland, Ohio. The product thus developed is called FTE, standing for "fritted trace elements" -- for the elements are embodied in a matrix of glass and are applied to the soil in the form of finely pulverized particles of this matrix.

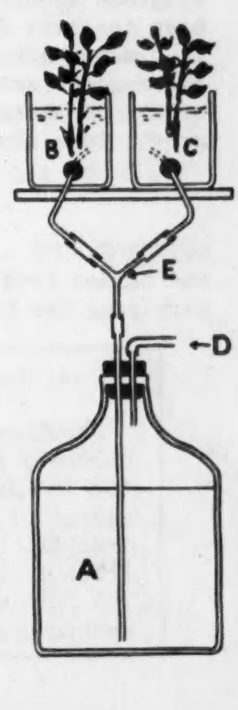
No Plant Damage

At the rate at which the elements are released from this medium, there is no danger of plant injury if more than the specified dosage of FTE is applied. Similarly, it has been proved that elements in this form do not leach out of soil and become unavailable to root systems.



Yield from equal rows of a potato experiment are shown at left. The row treated with equivalent of 200 pounds of FTE per acre produced the potatoes shown at right -- an increase of about 40 per cent in yield over the untreated row which produced the potatoes shown at left.

This experiment in a laboratory at Michigan State College supplied one of the first proofs of the slow solubility and resistance to leaching of FTE. The plants used for the test were wheat. Diagram at right shows in detail the experimental set-up. Container A holds a solution containing all plant nutrients except iron and manganese. Container B is filled with a special form of FTE containing only iron and manganese. Container C contains only quartz sand with no nutrients. Air pumped in at D forced liquid A through the Y-tube (E) into both B and C containers. If the iron and manganese in B were in soluble form, the solution in A would soon contain its original nutrients, plus iron and manganese, and these two elements would in turn be fed to plants in C. Proof that this does not happen is seen in the normal growth of plants in B, while those in C show obvious symptoms of iron and manganese starvation.



It is false to assume that a plant is not deficient in trace elements until pathological symptoms characteristic of the deficiency appear. Plants respond to additions of trace elements despite the absence of visual deficiency symptoms on certain parts of the plant. There is conclusive evidence that plant growth is retarded unless an adequate amount of these trace elements is available. One of the best ways to insure a crop against a possible deficiency is to apply a fertilizer containing trace elements.

In the past two years, field tests with FTE applied to the soil (at rates of 25, 50, 100, and 200 lbs. per acre), in addition to the regular fertilizer application, have shown increased yields on many vegetable crops. Slowly soluble trace elements applied to a Wooster silt loam soil in Ohio increased

tomato yields 18%, potatoes and peas 5%, and peppers as much as 23%. In another field, on the same type of soil, tomato yields were increased 35%. At Willard, Ohio, on a highly productive muck soil, slowly soluble trace elements in the form of FTE increased the yield of potatoes 12%, peas 15%, carrots 11%, and onions 10%. At Marietta, Ohio, in a sandy loam soil, tomato yields were increased 13%, potato yields 6%, peas 45%, peppers 33% and cabbage 11%. In Van Wert County, Ohio, where tomatoes are grown as a field crop primarily for processing plants, FTE applied to the soil increased the yield and held the foliage better than the untreated plants. Although several different slowly soluble trace element formulations were applied in the previously mentioned tests in Ohio, FTE containing six of the trace elements (iron, manganese, zinc, copper, boron, and molybdenum) gave the best results.

In Virginia, another series of field tests where slowly soluble trace elements were applied to the soil at recommended rates of application, the yield of certain vegetable crops was increased substantially. In a Matapeake sandy loam soil, cucumber yields were increased 43%, peppers 7%, and sweet corn 6%. On the Eastern Shore sweet potato yields were increased 15% and tomato yields 7%.

South Carolina Soybeans

Although soybeans are not considered a vegetable crop, it is worthy to note that slowly soluble trace elements applied to a Cecil loam soil in South Carolina at the rate of 100 pounds per acre increased the yield of soybeans by four bushels per acre.

It is interesting to note that in all field tests discussed in this article, none of the untreated plots had plants which exhibited visual or acute symptoms of trace-element deficiencies. It is becoming more apparent that trace elements can limit vegetable yields without the grower being aware of it. Many unexplainable problems relating to declines in quality and yield of certain vegetable crops can be corrected by applications of trace elements to the soil.

No good grower will let his crop reach a stage of deficiency where visual symptoms appear on the plant; however, it is possible for trace element deficiencies to limit crop growth without the grower being aware of it, for lack of specific plant symptoms. This means it is good practice to apply trace elements as an insurance measure, since only small amounts are required. To minimize the possibility of these deficiencies, it is desirable to supply trace elements for plant growth in a slow and continuously available form throughout the growing season.

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EDITOR'S NOTE - FTE for home garden use is being made available this year through the Garden Products Section of the Du Pont Company, while the Ferro Corporation is supplying the product as a fertilizer additive.

AG EDITORS ENJOY BLUEGRASS HOSPITALITY

Members of the American Agricultural Editors' Association visited Kentucky farms and Kentucky industries during their annual spring meeting in Louisville. Genial host to the meeting was President Jack Matlick, editor of "Kentucky Farmer," aided by Sam Guard, editor of "Breeders' Gazette." Their splendid program of tours and meetings drew the largest group of editors ever to attend a session outside of Washington, D. C. The fall meeting of the association is scheduled for Sept. 14-16, in Washington.

TWENTY-SIX REASONS

...why the rapid evolution of farm mechanization has been made possible in these United States

By EUGENE G. McKIBBEN
Director of Agricultural Engineering Research
U. S. Department of Agriculture

More changes have occurred in rural life and agricultural production during the past hundred years than in all previous time. The increasing application of engineering has been one of the fundamental factors. Electric lights, running water, refrigeration, motor transportation, milking machines, and most of present-day planting, harvesting, and processing machines were unknown on American farms in 1852.

This evolution is the most significant change in American agriculture. It has placed farming on a par with other occupations and industries. It is no longer necessary for farm workers to labor from dawn to dark. The labor of women and children is no longer required.

How important to society is this evolution of farm machines and implements? For the common man, for all men of good will, it is one of the outstanding events of history. It has removed the necessity for a peasant or serf class, a class exemplified by Millet's well-known painting and Markham's poem "the man with the hoe." It has released from the absolutely necessary occupation of agriculture the labor required for the less necessary but highly desirable production of a great variety of goods and services. These goods and services have resulted in a continuous rise in the general standard of living, to the highest yet attained. Because of this evolution it is possible now for all men to enjoy the benefits of citizenship in a cultured civilization.

Assuming that our present state of farm mechanization is the result of evolution, why did this evolution attain its maximum rate here in the United States during the past century? No one, of course, can give a positive answer to this question, but it appears that this historic evolution is the result of a combination of favorable circumstances, a combination unique in the world's history and one which probably will not appear again.

Some of the elements of this combination are:

1. A stable, equitable government over a large area.

2. A government which favored initiative and free enterprise without internal trade barriers.

3. A publicly supported system of compulsory education.

4. The psychology of increased production developed by a people who had settled in a new land, to conquer it, develop it, and make it their home.

5. The psychology of change which became intensified as the more adventurous of each generation moved west to pioneer a new frontier.

6. A rapidly increasing population occupying new lands allowed the introduction of new machines and new methods without the necessity for discarding the old.

7. A surplus of clear, level land well-suited to mechanization.

8. The absence of a peasant or serf class in much of the area.

9. A shortage of agricultural labor, at least only a very infrequent surplus of labor. Under such conditions great emphasis was placed on production per man.

10. Three all-out wars which produced severe labor shortages. The Civil War established the reaper, World War I the tractor and combine harvester, and World War II the cotton picker.

11. A rapidly expanding and effective industrial development which absorbed the labor released by farm mechanization and which supplied many of the elements needed to perfect and produce new farm machines and implements as they evolved.

12. A remarkable development of transportation -- railroads, high-quality hard-surfaced highways with trucks, buses and automobiles and the airplane.

13. Vastly more effective manufacturing methods for making agricultural implements such as automatic precision machine tools and well-managed assembly lines.

14. Lower cost methods of producing steel and other metals.

15. The gas welding and cutting torch and electric arc welding. These processes have been, and are, of great importance through the life cycle of farm machines from manufacture, through adaptation and maintenance to the final scrapping at the end of a useful life.

16. The evolution of the internal-combustion engine and the coordinate development of fuels and lubricants for this engine.

17. The introduction of pressure-gun lubrication.

18. The development of simple, efficient electric motors. These are doing for farmstead labor what the internal-combustion engine did for farm field labor.

19. The development of low-cost high-quality antifriction bearings.

20. The perfecting of enclosures for transmissions and effective seals for protruding shafts.

21. The evolution of the airplane which has become an important link in the chain of farm mechanization.

22. The evolution of the pneumatic tire which was developed for road transportation, but is currently an important element of many farm machines.

23. Hydraulic control systems, originally developed for industrial transportation and construction equipment.

24. Outstanding advances in the biological sciences of agriculture. Plant breeders have greatly aided mechanization by producing varieties better suited to mechanical harvesting -- grain sorghums of uniform growth, shatter-proof small grains, hybrid corn, and stormproof cotton are examples.

25. A progressive agricultural chemical industry which has supplied increasingly effective chemicals for fertilizing; for disease, insect, and weed control; for growth control such as defoliation for cotton harvest or fruit retention for a better apple harvest. The highly intriguing possibility of a practical conditioner for aggregating impervious soils is the newest promise.

26. Improved processing plants which enable these plants to handle mechanically harvested products. Sugar mills and cotton gins are examples.

The above article is an excerpt from "The Evolution of Farm Implements and Machines" by Mr. McKibben, which appeared in a recent issue of AGRICULTURAL ENGINEERING.

METHOXYCHLOR KILLS DDT-RESISTANT POTATO BEETLES

When Colorado potato beetles showed up in Long Island potato fields this spring, it was the first time some of the younger growers had ever seen one. DDT had been giving virtually perfect control for the past eight years.

A large proportion of the 1953 generation of beetles proved resistant to DDT, however, and a critical situation developed to threaten much of the $30,000,000 crop. R. J. Quinton, entomologist at the Long Island Vegetable Research Farm at Riverhead, operated by Cornell University's agricultural experiment station, had tested about a dozen chemicals against a few DDT-resistant beetles found late in 1952. Methoxychlor insecticide proved one of the outstanding materials and these quick tests were the basis for suggesting its use when DDT failed to stop the pests this year. Using two pounds of 50 per cent methoxychlor wettable powder per 100 gallons of spray per acre, growers achieved close to 100 per cent kill of both the hard-shelled adults and the soft larvae.

DDT resistance was not the only factor that made the problem severe this year. A mild winter allowed an unusually high survival of over-wintering beetles. As high as 200 beetle larvae were counted on a single potato plant.

In addition to its exceptionally low order of toxicity to warm-blooded animals, methoxychlor has the advantage of controlling not only Colorado potato beetles, but flea beetles and leafhoppers as well.

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EXPERIMENTERS' NOTATIONS

A Round-up of Data from Across the Nation

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In 1949, a continuing test was started in the Champlain Valley of New York to compare the effects of ferbam and sulfur on the growth and yield of McIntosh apple trees. Recent data from that test, as reported by A. B. Burrell, plant pathologist of Cornell University, at the 1953 New York State Horticultural Society meeting included the following observation: "In 1952, the ferbam plots averaged 8.7 bushels per tree versus 5.8 bushels for the sulfur. For the last three years of the test, which has been in progress for four years, the ferbam trees bore 25 per cent more bushels of fruit." Ferbam is the generic term for ferric dimethyldithiocarbamate, the active ingredient in "Fermate" fungicide. It was one of the first of the "carbamate" family of modern organic fungicides, each of which has filled a specific need in the field of plant disease control.

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Green-picked tomatoes should be held or shipped at temperatures between 50 and 65 degrees Fahrenheit, according to laboratory tests and studies of cross-country shipments. Lower temperatures result in slow ripening, poor flavor, development of alternaria rot, and pale or mottled color. Higher temperatures may cause the fruit to ripen yellow instead of red, or bring on soft rot or other types of decay.

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The organic phosphate insecticide, EPN, is receiving favorable mention in progress reports on the control of two different species of leaf miner. From Texas, it is learned that a spray applying two pounds of EPN-300 per acre gave excellent control of the serpentine leaf miner on peppers, results being superior to those obtained with other materials tested. In California, Dr. Harold Madsen, entomologist at the University of California, conducted tests last summer in the control of pear leaf miner, which has become a serious pest in the Placerville and Auburn Hill areas of that state. Among several materials tried, he reported that EPN-300 at a half-pound per 100 gallons of spray gave promising results, killing both the moths and the miners inside the leaf.

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In Forest Service experiments near Lander, Wyoming, it was noted that 2½ times more grass was produced on range lands where 80 per cent of the sagebrush had been killed by chemical sprays three years before. Most efficient of the chemicals tested was 2,4,5-T isopropyl and amyl ester. One pound, acid equivalent, of this material in three to five gallons of diesel oil killed an average of 84 per cent of the sagebrush sprayed during the period between mid-May and mid-June. This was at the stage of rapid twig and flower stalk growth.

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